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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/554,225

10/25/2005

Bernardus Hendrikus Wilhelmu Hendriks

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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BRIARCLIFF MANOR, NY 10510

EXAMINER

KIM, JOHN K

ART UNIT

PAPER NUMBER

4125

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/554,225	Applicant(s) HENDRIKS ET AL.	
	Examiner JOHN K. KIM	Art Unit 4125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-23 is/are rejected.
- 7) ☒ Claim(s) 3, 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/14/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 4-9 and 16-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (IEEE publication, "Surface-Tension-Driven Microactuation Based on Continuous Electrowetting", Junghoon Lee and Chang-Jin "CJ" Kim, JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, VOL. 9, NO. 2, JUNE 2000).

As for claim 1, Lee teaches (in Fig. 11) a motor (Figs. 1 and 11 and sketch below), comprising a first body (3), a second body (5) movably mounted with respect to the first body (3), a chamber (4) situated between a surface of the first body (3) and a surface of the second body (5), said chamber (4) being filled with a non-polar and/or non-conductive first fluid (6) (electrolyte, e.g. H₂SO₄ in Fig. 3) and at least one volume of a polar and/or conductive second fluid (Hg) (7a-d), the fluids (6, 7) being immiscible (inherent property), wherein one of surfaces, to be called the first surface (A in sketch Fig. 1 below), is provided with means for locally varying the wettability (B. CEW in page

172) of surface by the second fluid (7) and the other surface, to be called the second surface (B in sketch Fig. 1 below), is provided with means for coupling the or each volume of second fluid (7a-d) to the second surface (15).

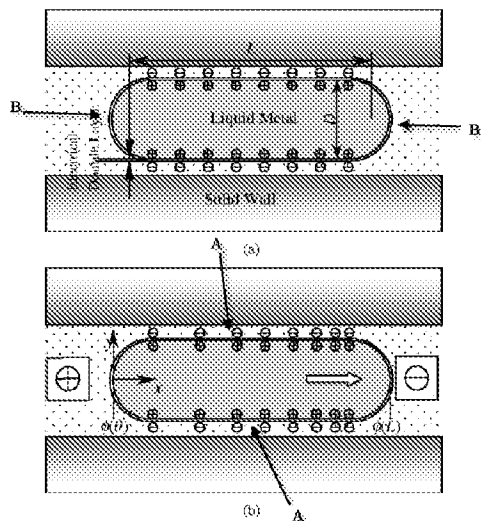


Fig. 1. CEW effect. (a) EDL and initial charge. (b) Electrically varied surface tension.

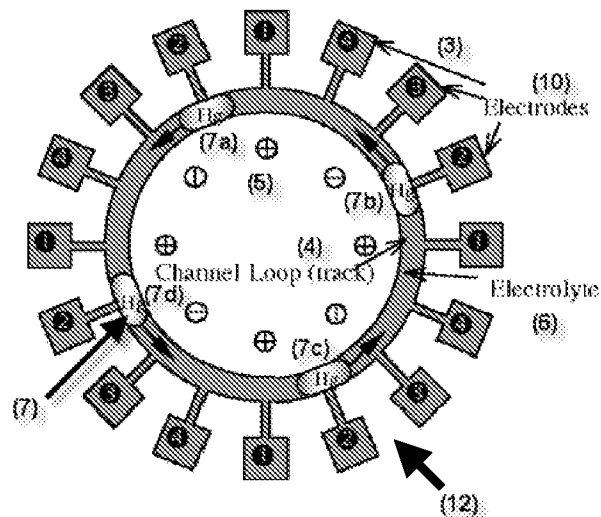


Fig. 11. Concept for liquid micrometer.

As for claim 2, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Further, Lee teaches (in Figs. 1 and 11) the coupling means comprise at least one area (B surface area in sketch Fig.1 above) of high wettability by the second fluid (7), said area being bounded by an area (A surface area in sketch Fig.1 above) of low wettability by said second fluid (7), at least in a direction (arrow in sketch Fig.1 above) of relative movement of said first and second surface.

As for claim 4, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Further, Lee teaches (in Figs. 1 and 11) the means for locally varying the wettability of the first surface (A surface area in sketch Fig.1 above) and/or the

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second surface (B surface area in sketch Fig.1 above), comprise a series of neighboring electrodes (10), separated from the second fluid (7) by an interfacial layer (12) (B. CEW in page 172), and means for sequentially powering successive electrodes (10) so as to apply an electric potential across said interfacial layer (12), causing the condition thereof to switch between low and high wettability by the second fluid (7). (B. Rotation by Commutation in page 177)

As for claim 5, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Further, Lee teaches (in Fig. 11 and sketch in above) the electrodes (10) are spaced at substantially regular intervals along an intended path of movement of the or each volume (7a-d) of second fluid.

As for claim 6, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Further, Lee teaches (A. electrocapillary, page 172) the second fluid (7) is a liquid. (mercury)

As for claim 7, Lee clearly shows and discloses the claimed invention as applied to claim 6 above. Further, Lee teaches (A. electrocapillary, page 172) the second fluid (7) is a liquid metal.

As for claim 8, Lee clearly shows and discloses the claimed invention as applied to claim 7 above. Further, Lee teaches (A. electrocapillary, page 172 and Fig. 3) the first fluid (6) is an electrolyte. (e.g., H₂SO₄ in Fig. 3)

As for claim 9, Lee clearly shows and discloses the claimed invention as applied to claim 8 above. Further, Lee teaches (in Figs. 1 and 3) the first fluid (6) forms the interfacial layer. (A. electrocapillary, page 172)

As for claim 16, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee further teaches (in Figs. 11, 12 and sketch in claim 1) the first and the second body (3, 5) are both substantially cylindrical, wherein one of the bodies (3, 5) is concentrically received within the other body (5, 3) and the chamber (4) is enclosed between the inner surface of the outer body and the outer surface of the inner body.

As for claim 17, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee further teaches (in Figs. 11, 12 and sketch in claim 1) the motor is a rotary motor (B. Rotation by Commutation in page 177), wherein the second body (5) is arranged for rotating movement with respect to the first body (3).

As for claim 18, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee further teaches (in Fig. 1) the motor is a linear motor (B. CEW),

wherein the second body (liquid metal) is arranged for translating movement with respect to the first body (solid wall).

As for claim 19, Lee clearly shows and discloses the claimed invention as applied to claim 16 above. Lee further teaches (in Fig. 1) the electrodes (10) are spaced at regular radial intervals along the circumference of one of the bodies (3, 5).

As for claim 20, Lee clearly shows and discloses the claimed invention as applied to claim 16 above. Lee further teaches (in Fig. 11 and sketch in above) the inner body is the second, moveable body (5).

As for claim 21, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee further teaches (in Figs. 1 and 11 and sketch in above) the first surface (A surface area in sketch Fig.1 above) belongs to the first body (solid wall or 3) and the second surface (B surface area in sketch Fig.1 above) belongs to the second, moveable body (liquid metal or 5).

As for claim 22, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee further teaches (A. electrocapillary, page 172) the chamber (4) between the first and second body (3, 5) is of capillary dimensions. (10-100 Angstroms)

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (IEEE publication, "Surface-Tension-Driven Microactuation Based on Continuous Electrowetting", Junghoon Lee and Chang-Jin "CJ" Kim, JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, VOL. 9, NO. 2, JUNE 2000) in view of Ticknor et al (US 2003/0012483).

As for claim 10, Lee clearly shows and discloses the claimed invention as applied to claim 6 above. Lee, however, failed to teach the second fluid (7) is an aqueous solution, for instance water, more particularly salted water. In the same field of endeavor, Ticknor teaches (in Fig. 4) the second fluid (7) is an aqueous solution, for instance water, more particularly salted water. [0108] Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Ticknor with teachings of Lee to use salted water for the second fluid for low cost conductive liquid slug.

As for claim 14, Lee and Ticknor clearly show and disclose the claimed invention as applied to claim 10 above. Ticknor further teaches (in Fig. 6) the first fluid (602) is a gas, for instance air. [0123] Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Ticknor with teachings of Lee to use air as the first fluid for cheapest solution to replace electrolyte.

4. Claim 11-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (IEEE publication, "Surface-Tension-Driven Microactuation Based on Continuous Electrowetting", Junghoon Lee and Chang-Jin "CJ" Kim, JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, VOL. 9, NO. 2, JUNE 2000) in view of Ticknor et al (US 2003/0012483) and in further view of Pamura et al (US 2004/0058450).

As for claim 11, Lee and Ticknor clearly show and disclose the claimed invention as applied to claim 10 above.

The references fail to teach the interfacial layer is a dielectric layer having a low wettability. In the same field of endeavor, Pamura, however, teaches (in Fig. 1) the interfacial layer (23) is a dielectric layer having a low wettability (low wettability characteristic that parylene or AF 1600 has) by the second fluid (b). [0091] Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Pamura with teachings of Lee and Ticknor to make the dielectric layer is made of hydrophobic insulating material to obtain the saturation concentrations be sufficiently low to avoid large-scale mixing of the fluids.

As for claim 12, Lee, Ticknor and Pamura clearly show and disclose the claimed invention as applied to claim 11 above. Ticknor further teaches [0095] the dielectric layer (interface solid wall) is made of hydrophobic insulating material, or alternatively, Pamura teaches [0098] the dielectric layer (interface solid wall) is made of hydrophobic insulating material. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Pamura or Ticknor with teachings of Lee to make the dielectric layer is made of hydrophobic insulating material to obtain the saturation concentrations be sufficiently low to avoid large-scale mixing of the fluids.

As for claim 13, Lee, Ticknor and Pamura clearly show and disclose the claimed invention as applied to claim 12 above. Pamura further teaches [0091] the hydrophobic insulating material is Parylene or AF1600. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Pamura with teachings of Lee and Ticknor to use Parylene or AF1600 for dielectric layer material to obtain hydrophobic insulating property.

As for claim 15, Lee and Ticknor clearly show and disclose the claimed invention as applied to claim 10 above. Pamura further teaches [0091] the second surface (25) is covered by or made of hydrophobic material (Parylene or AF1600) and provided with at least one area (27) of hydrophilic material, to form an area having a low wettability by the second fluid (b). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Pamura with teachings of Lee and Ticknor to make the second surface covered by hydrophobic material to increase the surface tension.

5. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (IEEE publication, "Surface-Tension-Driven Microactuation Based on Continuous Electrowetting", Junghoon Lee and Chang-Jin "CJ" Kim, JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, VOL. 9, NO. 2, JUNE 2000) in view of Pamura et al (US 2004/0058450).

As for claim 23, Lee clearly shows and discloses the claimed invention as applied to claim 1 above. Lee, however, failed to teach the chamber (4) comprises channels for the second fluid (7), said channels being formed by covering the second surface with or making the second surface of a material with low wettability by the second fluid (7) and providing the surface with a channel-constituting pattern of material with high wettability by the second fluid.

In the same field of endeavor, Pamura teaches (in Fig. 1 and sketch above) the chamber (EDL between 23 and 27) comprises channels for the second fluid (b), said channels being formed by covering the second surface with or making the second surface of a material with low wettability (area of A in 23 or 27 as being made by hydrophobic coating) by the second fluid (b) and providing the surface with a channel-constituting pattern of material with high wettability (area of B facing EDL 'd') by the second fluid (b).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Pamura with teachings of Lee to combination of low and high wettability materials to produce electro-capillary action.

Allowable Subject Matter

6. Claims 3 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN K. KIM whose telephone number is (571)270-5072. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on 703-585-9637. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JK

/Charles D. Garber/
Supervisory Patent Examiner, Art Unit 4125